Department of Mathematics & Statistics
Concordia University

MATH 204
Vectors and Matrices
Fall 2025

Instructor*: _____

Office/Tel No.: _____

Office Hours: _____

*Students should get the above information from their instructor during class time. The instructor is the person to contact should there be any questions about the course.

Textbook: *Elementary Linear Algebra*, Custom Version, 12th Edition, by H. Anton, C. Rorres & A. Kaul (John Wiley & Sons).
. The hard-copy text can be purchased at the Concordia bookstore, https://www.bkstr.com/concordiastore/home.
Note: Students should order textbooks as early as possible, especially for printed versions in case books are backordered or there are any shipping delays.

Prerequisite: MATH 201 or equivalent.

Office Hours: Your professor will announce her/his office hours during which she/he will be also available to give a reasonable amount of help. Note, however, that if you missed a class it is not reasonable to expect your professor to cover the missed material for you.

Tutorials: The material in this course requires a lot of practice. The Department has therefore organized special tutorial sessions conducted every week to provide additional support to students outside the lecture environment. These sessions are conducted by tutors who will help with solving problems on the topics learned in class that week, with particular emphasis on the material that students may have difficulties within this course. Students may attend either of the scheduled tutorials and are strongly encouraged to participate and be active in these problem-solving sessions. Tutorials are an important resource to help students succeed in this course.

Math Help Centre: A Math Help Centre staffed by graduate students is available. The schedule of its operation will be posted in the Department and on the Department webpage https://www.concordia.ca/artsci/math-stats/services/math-help-centre.html.

WeBWorK: Every student will be given access to an online system called **WeBWorK**. The system provides you with many exercises and practice problems. Students will use this system to

do online assignments (see **Assignments** below). In addition, before the midterm test and before the final exam, a number of practice problems will be posted in **WeBWorK** to help you review the material of the course.

Assignments: Students are expected to submit assignments online using **WeBWorK**. Late assignments **will not** be accepted. Assignments contribute 10% to your final grade. Working regularly on the assignments is essential for success in this course. Students are also strongly encouraged to do as many problems as their time permits from the list of recommended problems included in this outline, as well as practice problems. A solutions manual for all odd-numbered questions is packaged with the textbook.

Calculators: Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted for the class test and final examination. For a list of Approved calculators see https://www.concordia.ca/artsci/math-stats/services.html#calculators\

Reading Week: No classes between October 11 and October 17, 2025.

Midterm Test: There will be **one midterm test**, based on the material of weeks 1-6 (see CONTENTS below), which will contribute up to 30% to your grade (see the **Grading Scheme**). The test will be common for all sections of the course and will be held on **Sunday, 26 October 2025, starting at 17:30 (**i.e. **5:30 P.M.)** and will be 1.5 hour long**.** The rooms for the test will be announced one week before the test.

Students who are unable to write the midterm test for a valid reason must inform their instructor in advance to request a 90% final exam option for their grade (*see the NOTE below*). Such a request **will not** be granted unless it is made in writing by email, the reason accepted as valid and supported by appropriate letter or other documentation. **Valid reasons** for missing the midterm test include time conflicts (coinciding **exam times**) with other exams, religious observances (must be reported to the instructor ***in advance***), illness (to be reported as soon as possible and supported by a valid medical note), a scheduled academic or athletic event (the student must be an active member of the team, to be supported by a letter from the coach). Students who miss the midterm test but were not approved for "90% final exam + 10% assignments" option as described above will not be granted it and will forfeit the marks for the midterm test.

N.B.: Travel arrangements are not considered a valid reason for missing the midterm test.

NOTE: If you are taking another course with a common midterm test at the same time (NOT just the day) as this one, you may choose which of the two tests you want to write. If you are choosing to write the midterm for this course, you must then inform the instructor of the other course that you will not write their test because of the time conflict. If the midterm to be missed is from MATH 200-MATH 209 then the "90% final +10% assignments" scheme will be applied to calculate your grade for that other MATH course.

Final Exam: The final examination will be three hours long and will cover all the material in the course.

NOTE: Students are responsible for finding out the date and time of the final exams once the schedule is posted by the Examinations Office. Conflicts or problems with the scheduling of the final exam must be reported directly to the **Examinations Office, not to your instructor**.

Grading Scheme: The final grade will be based on the higher of (a) or (b) below:

a) 10% for the assignments,
30% for the midterm test,
60% for the final exam.

b) 10% for the assignments,
10% for the midterm test,
80% for the final exam.

NOTE: Because the midterm test in option (A) contributes as high as 30% to your Grade, the "Short-Term Absence form" cannot be used as a valid justification for missing the midterm test for either grading option.

IMPORTANT: **PLEASE NOTE THAT THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE.**

Lectures	Sections	Topics	Recommended problems
1	1.1 1.2	Systems of Linear Equations Gaussian Elimination	1.1: 12, 15b, 20, 21 1.2: 3, 6, 8, 17, 18, 22, 23, 25, 26, 28, 33, 37
2	1.3 1.4	Matrices and Matrix Operations Inverses;Algebraic Properties of Matrices	1.3: 3fj,6de,7d 1.4: 1b, 2c, 17, 22, 29
3	1.5 1.6	Elementary Matrices; Method to find A^{-1} Linear Systems and Invertible Matrices	1.5: 4cd, 15, 17 1.6: 5, 12, 16, 19 Chapter 1 Supplementary Exercises: 9, 10, 11, 13 a, b, c
4	2.1 2.2	Determinants by Cofactor Expansion Evaluating Determinants by Row Reduction	2.1: 3c, 25 2.2: 11
5	2.3 3.1	Properties of Determinants, Cramer's Rule Vectors in 2-space, 3-space	2.3: 22, 27, 34, 35 Chapter 2 Supplementary Exercises: 15, 31, 32 3.1: 10d, 20, 21, 27
6	3.2 3.3	Norm, Dot Product, Distance in R^2,R^3 Orthogonality	3.2: 9, 11a 3.3: 4, 8, 13, 21, 25, 27
7	3.4	Geometry of Linear Systems **Midterm Review** class (if time permits!)	3.4: 4, 10, 13, 16
8	3.5 4.1	Cross Product Real Vector Spaces	3.5: 7, 16, 18 Chapter 3 Supplementary Exercises: 1abcdef, 4, 6, 7, 12, 13, 14, 16, 23 4.1: 17,b18
9	4.2 4.3, 4.4	Subspaces Spanning Sets, Linear independence	4.2: 1, 6, 8a, 11 4.3: 2, 3, 6, 8 abcd 4.4: 1, 2, 7

10	4.5, 4. 6 1.8	Coordinates and Basis Dimension Linear Transformations	4.5: 3, 7, 13 4.6: 1, 5, 8, 18 1.8: 13abc, 27, 29, 32, 36, 37, 46
11	5.1 5.2	Eigenvalues and Eigenvectors Diagonalization	5.1: 5ab, 7, 8,14, 19, 20, 21, 22, 24, 25ab, 32, 33 5.2: 6, 7, 8, 19, 20c
12		**REVIEW**	

Student Services
You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.